

## NATURAL RESOURCES CONSERVATION SERVICE

### CONSERVATION PRACTICE STANDARD

## DAM, DIVERSION

(No. or Ft.)

CODE 348

### DEFINITION

A structure built to divert all or part of the water from a waterway or a stream.

### PURPOSE

To divert all or part of the water from a waterway in such a manner that it can be controlled and used beneficially or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows.

### CONDITIONS WHERE PRACTICE APPLIES

This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. It does not apply where Diversion (362), Dam (402), or Grade Stabilization Structure (410) would be used.

This practice applies where:

- a diversion dam is needed as an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources,
- diversion of water from an unstable watercourse to a stable watercourse is desirable,
- the water supply available is adequate for the purpose for which it is to be diverted,
- adverse environmental impacts resulting from the installation of the practice can be overcome.

### CRITERIA

The installation and operation of this practice shall comply with all federal, state and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

The owner is responsible for securing necessary permits, complying with all laws and regulations, and meeting legal requirements applicable to the installation and operation and maintenance of the dam and associated structures.

All structures must comply with the applicable design requirements of the State Engineer of Colorado. To be exempt from Colorado regulations, no significant storage may be impounded.

**Environmental Impacts** - The impact of a proposed dam on water quality, fish and wildlife habitat, forest, and visual resources shall be evaluated and the techniques and measures necessary to overcome the undesirable effects shall be identified and addressed.

**Materials** - All materials to be used in constructing the diversion dam and appurtenances shall have the strength, durability, and workability required to meet the installation and service conditions of the site.

**Structural design** – Appurtenant structures shall be designed to withstand all anticipated loads.

**Outlet works** - If part of the flow is to be diverted, the outlet works must provide for positive control of both maximum and

minimum flow rates consistent with the purpose for which the diversion is made. The outlet works must provide for safe diversion of all expected flows, considering such hazards as the potential for erosion, cavitation, and reduction in flow capacity due to the buildup of debris and sediment.

The bottom of the canal or diversion ditch shall be at least a minimum distance below the invert of the principal spillway or of the crest of the auxiliary spillway, if no principal spillway is used. The minimum distance shall be the greater of the following: (1) 1 foot or (2) the maximum depth of water at the canal or diversion ditch entrance

**Bypass works** - The bypass works must be capable of passing all flows needed to satisfy downstream priorities and all flows in excess of diversion requirements, including expected flood flows. This may require a combination of orifices, weirs, and gates designed to meet the requirements of the site. The bypass works must provide for safe bypass of all expected flows, considering such hazards as the potential for erosion, cavitation, and reduction in flow capacity due to the buildup of debris.

An ungated outlet must be provided to drain any impoundment in excess of 2 acre-feet. The minimum pipe diameter shall be 12 inches.

**Special-purpose works** - If debris, bedload materials, or sediments are present under flow conditions subject to diversion, provision shall be made to bypass or remove materials that may be detrimental to the functioning of the outlet works, to other parts of the works, or to areas to which diversion is made. This may require the use of settling basins, debris traps, trash guards, or sluiceways, depending on site conditions.

**Vegetation** - Disturbed areas, not otherwise covered or protected, shall be vegetated as soon as practicable after construction. If soil or climatic conditions preclude the use of vegetation, and protection is needed, non-vegetative materials, such as mulches, gravel, and rock riprap may be used. As a minimum, seedbed preparation, seeding, fertilizing, and mulching shall be in accordance with Conservation Practice Standard – 342 Critical Area Planting. The vegetation shall be

maintained and undesirable species controlled.

### Earth Diversion Dams.

Class (a) dams that have product of storage times the effective height of the dam of 3,000 or more, those more than 35 ft in effective height, and all class (b) and class (c) dams shall meet or exceed the requirements specified in Technical Release No. 60 (TR-60).

Class (a) dams that have a product of storage times the effective height of the dam of less than 3,000 and an effective height of 35 ft or less shall meet or exceed criteria specified for Ponds (378).

Site conditions shall be such that runoff from the design storm can be safely passed through (1) an open-flow principal spillway, (2) a combination of a principal spillway and an auxiliary spillway, or (3) a natural or constructed auxiliary spillway. The capacity of the principal spillway shall be such that the frequency of flow through the auxiliary spillway as related to the general condition of the auxiliary spillway shall not exceed:

General Condition of Auxiliary Spillway	Frequency of Flow Expected in Auxiliary Spillway
Sod, small drop	Every two years
Good spread, over shrubby banks	Every three or four years
No spread, over raw bank	Every eight years
Over sand bank or in building lots	Every twenty-five years

### CONSIDERATIONS

The effects of this practice on water quantity, water quality, and the environment should be considered during the planning process.

Effects to be considered are:

- effects on the water budget, on volume and rate of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge,

- effects of the use of diverted waters for irrigation,
- effects on the original watercourse, on the newly constructed watercourse, and on the area where the water is being diverted to and from,
- effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff,
- potential temperature changes in downstream waters resulting from differences in bank shading in different watercourses,
- potential changes in the amount of soluble substances infiltrating and available for ground water recharge as well as the potential for salt pick-up,
- potential for introducing new plant or animal species to either the upstream or downstream waters,
- effects on the natural migration of fish.

#### **PLANS AND SPECIFICATIONS**

Plans and specifications for installing diversion dams shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

#### **OPERATION AND MAINTENANCE**

Provisions shall be made for operation and maintenance requirements and, for larger more complex diversion dams, may include a formal plan. Typical maintenance may include the removal of accumulated trash and debris from the structure and the repair of gates, screens, and other appurtenances.

#### **REFERENCES**

USDA-NRCS, National Engineering Handbook (NEH), Part 636, Structural Design and Drop Spillways.

USDA-NRCS, NEH, Part 650 Engineering Field Handbook.

USDA-NRCS, Technical Release (TR) 60, Earth Dams and Reservoirs.

USDA-NRCS, TR 67, Reinforced Concrete Strength Design.

USDA-NRCS, TR-74, Lateral Earth Pressures.